PATENT ABSTRACTS OF JAPAN

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(54) PHOTO-CHARGING SECONDARY BATTERY

(57)Abstract:

PROBLEM TO BE SOLVED: To enable to make stable charging by providing a means of fixing to other member at the engaging part of the draw-out side end of the photoelectric conversion element.

SOLUTION: In the photo-charging secondary battery, a means of fixing to other member is provided at the engaging part of the draw-out side end of the photoelectric conversion element, thereby, the photoelectric conversion element is fixed in a specified direction.

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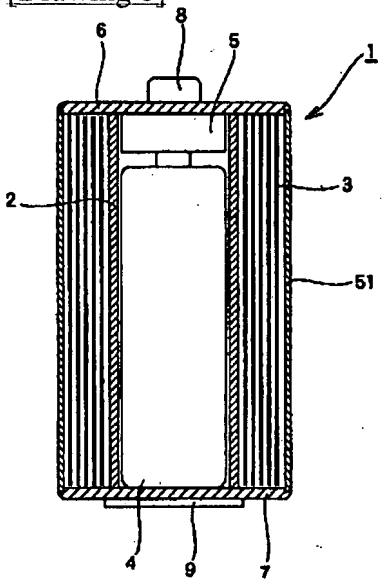
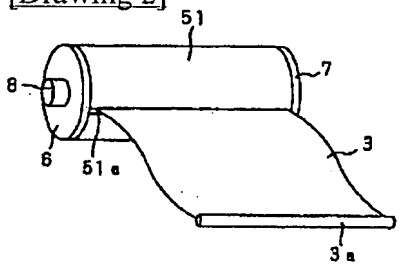
3.In the drawings, any words are not translated.

DRAWINGS

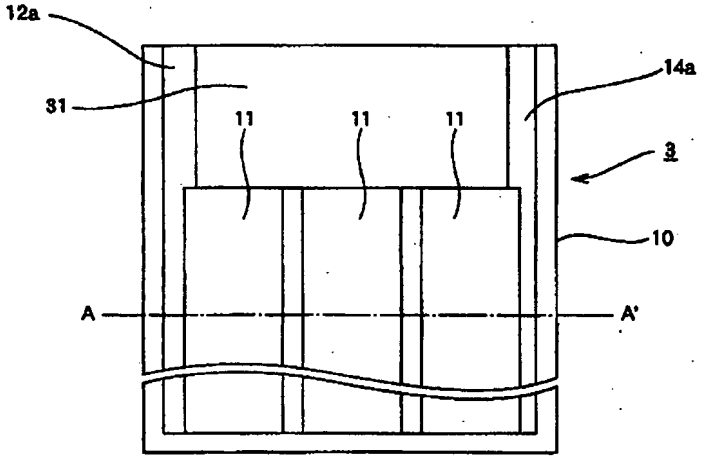
[Drawing 1]



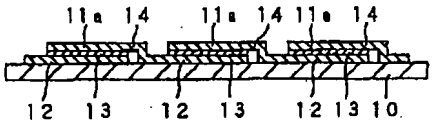
[Drawing 2]



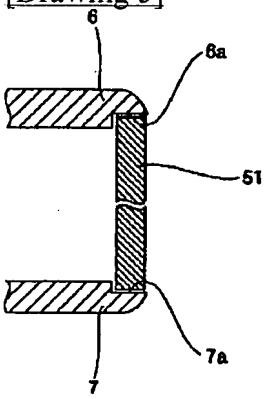
[Drawing 3]



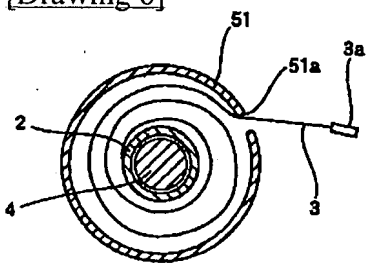
[Drawing 4]



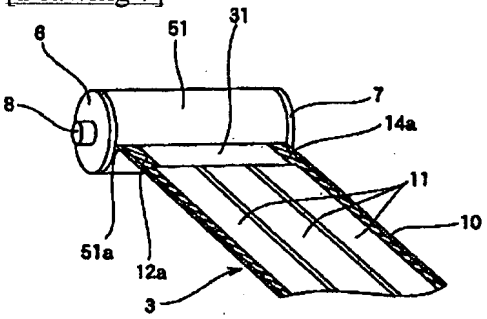
[Drawing 5]



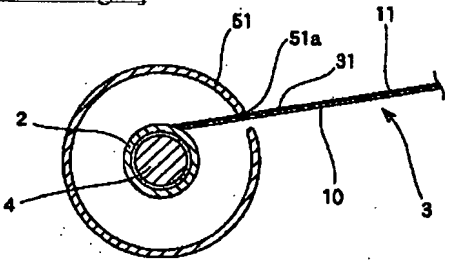
[Drawing 6]



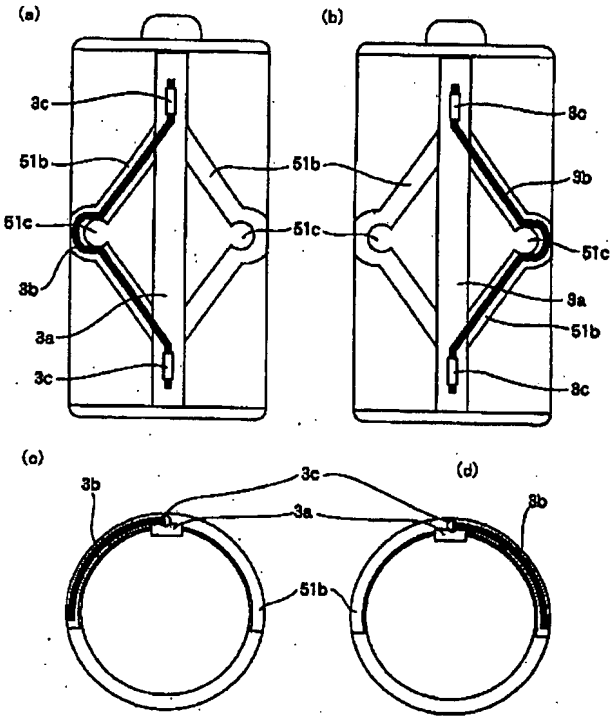
[Drawing 7]



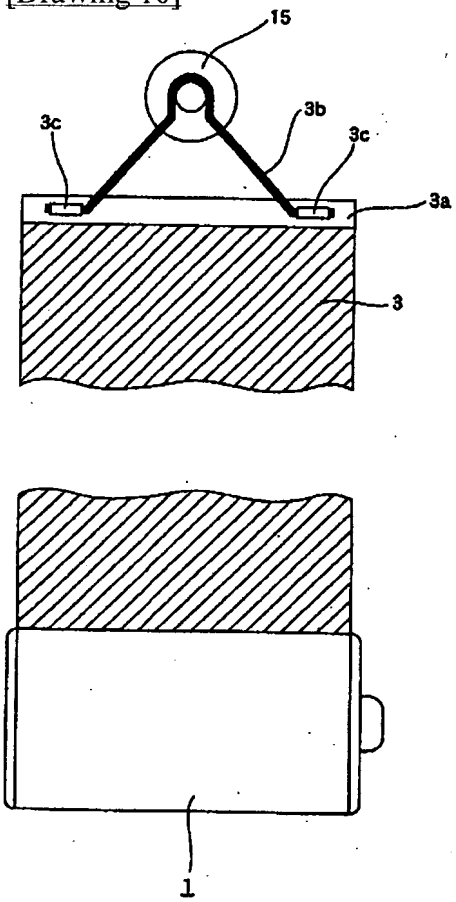
[Drawing 8]



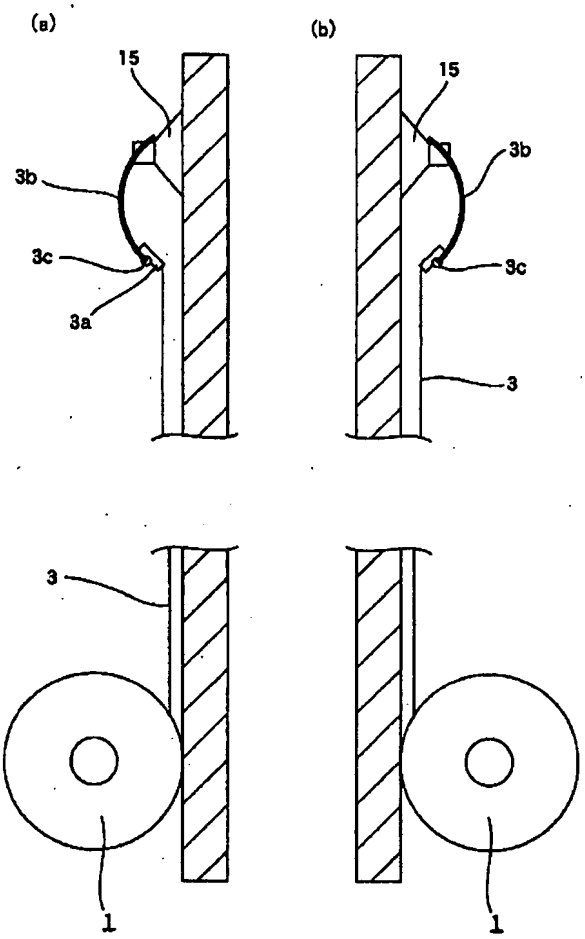
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the optical-rechargeable secondary battery considered as the configuration which charges a battery by the optoelectric transducer.
[0002]
[Description of the Prior Art] The optoelectric transducer is also called solar battery and is a component which transforms light energies, such as sunlight, into electrical energy. In case this optoelectric transducer takes out electrical energy from light energy, unlike the fossil fuel used from the former, it does not take out excretions, such as a carbon dioxide. Moreover, since an optoelectric transducer can take out electrical energy from light energies, such as sunlight mostly called inexhaustible supply, it can be generated semipermanently. Therefore, it is thought that the use application and use scale continue to expand an optoelectric transducer increasingly in view of global environment problems. However, the time fluctuation of an optoelectric transducer to light energies, such as sunlight, is large in many cases, and since the time fluctuation also to the electrical energy which changed and generated this light energy becomes large, it is not suitable for considering as the direct power source of an electrical machinery and apparatus in many cases. Moreover, since light energies, such as sunlight, exist in the thin condition spatially, an optoelectric transducer needs a big light-receiving area, in order to obtain the power of the specified quantity suitable for use. Therefore, the optoelectric transducer is used for the application of charging a battery once, making the changed electrical energy discharging from this battery, and using it as an auxiliary current of an electrical machinery and apparatus. On the other hand, the miniaturization is progressing and an electrical machinery and apparatus is used as the device of a pocket mold by progress of various processing techniques in recent years in many cases. Therefore, the dry cell which can be convenient to carry and can usually use an electrical machinery and apparatus easily as the power source is used. Then, the optical-rechargeable secondary battery with which the advantage of an optoelectric transducer which was mentioned above, and the convenience of a dry cell were constructed and united is proposed as indicated by JP,63-314780,A (cell), JP,2-73675,A (cylindrical shape charge type solar battery), etc. Such a conventional optical-rechargeable secondary battery has realized making the electrical machinery and apparatus usually used drive with the power produced with light energy by using it for a cylindrical shape specification cell mold combining the optoelectric transducer as the generation-of-electrical-energy section, and the battery as the charge-and-discharge section.
[0003] However, it cannot be equipped with the light-receiving area of an optoelectric transducer more than the outside-surface product of a battery on about [being difficult] and its structure that utilize effectively and the conventional optical charge rechargeable battery makes an optoelectric transducer receive light energies, such as sunlight irradiated from an one direction, for all the outside-surface products of a battery. Therefore, the conventional optical-rechargeable secondary battery had the problem that even power required [it is so long that the charging time at the time of charging a battery does not bear practical use, and] in order that an optoelectric transducer may charge a battery further might be unable to be generated. Then, the optical-rechargeable secondary battery which made it possible to use light energies, such as sunlight, as a power source of the electrical machinery and apparatus usually used was invented by combining the optoelectric transducer and battery which have flexibility (Japanese Patent Application No. No. 351505 [ten to]). By this invention, while having the practical charge engine performance, the optical-rechargeable secondary battery with the easy use as a power source of the electrical machinery and apparatus usually used was realized.
[0004] By the way, in case an optical-rechargeable secondary battery which was mentioned above charges a battery, it repeats the optoelectric transducer which has flexibility, and enlargement and light-receiving area are used for it, enlarging them. At this time, an optoelectric transducer receives the external force of the enlargement of a repeat. By advancing prototype examination, this external force found out that it was generated by friction with the optoelectric

transducer which has flexibility, and its sliding system, and had to be made so large that it cannot overlook. In this case, it turned out that the above-mentioned optoelectric transducer damages or deteriorates according to the above-mentioned external force, and the generating efficiency as the whole component falls, as a result the charge engine performance falls.

[0005]

[Problem(s) to be Solved by the Invention] This invention can fix an optoelectric transducer in the specific direction, stable charge is possible for it, and in order to prevent damage or degradation of the optoelectric transducer at the time of charge, it aims at giving the means which is fixable to other members in the stop section of the drawer edge of an optoelectric transducer.

[0006]

[Means for Solving the Problem] The optical-rechargeable secondary battery concerning this invention equips a cylindrical shape-like volume core part with the control circuit section which is made to wind the optoelectric transducer and the battery in which charge and discharge are possible which have flexibility, and is made to arrange free [a drawer], and controls the charge and discharge of a battery, and presents a whole cylinder abbreviation configuration to it. The upper flange and lower flange which were formed in approximate circle form plate-like, respectively are prepared in one, and the peripheral wall of the shape of a cylindrical shape which has a drawer hole used as the outlet of an optoelectric transducer is prepared in the both ends of a volume core part so that an optoelectric transducer may be covered. Moreover, in the configuration rolled round by the building envelope which the peripheral wall is supported free [an upper flange and a lower flange, and rotation], was pulled out when an optoelectric transducer rotated a peripheral wall, and was constituted by the volume core part and the peripheral wall, it is the optical-rechargeable secondary battery characterized by giving the means which is fixable to other members at the stop section of the drawer edge of an optoelectric transducer. Furthermore, the arcuate object is being fixed to the above-mentioned stop section rotatable, and the arcuate object is seen and ****(ed) from the side-face side, and, as for the optical-rechargeable secondary battery concerning this invention, is dismountable. Moreover, the arcuate object could reverse **** from a side-face side, and the curvature of the **** is substantially [as a peripheral wall] the same, and it is settled in the outermost periphery curved surface of a peripheral wall, and is the optical-rechargeable secondary battery characterized by stopping rotation.

[0007] Namely, this invention (1) The optoelectric transducer which has the flexibility which was wound to cylindrical shape-like a volume core part and the above-mentioned volume core part, and was arranged free [a drawer], Where it had the battery in which charge and discharge are possible, and the control circuit section which controls the charge and discharge of a battery and the above-mentioned optoelectric transducer is wound around the above-mentioned volume core part In the optical-rechargeable secondary battery which presents a whole cylinder abbreviation configuration to the above-mentioned volume core part The upper flange and lower flange which are located in the both ends and formed in approximate circle form plate-like, respectively are prepared in one. Cover the optoelectric transducer wound around the above-mentioned volume core part, and the peripheral wall of the shape of a cylindrical shape which has a cash-drawer hole used as the outlet of the above-mentioned optoelectric transducer is prepared. The optoelectric transducer which the above-mentioned peripheral wall was supported free [the above-mentioned upper flange and a lower flange, and rotation], and was pulled out by rotating the above-mentioned peripheral wall It is constituted so that it may roll round to the building envelope constituted by the above-mentioned volume core part and the above-mentioned peripheral wall. Rechargeable battery characterized by giving the means to the stop section of the drawer edge of the above-mentioned optoelectric transducer so that it can fix to other members (2) Where the above-mentioned optoelectric transducer is wound around the above-mentioned volume core part The optical-rechargeable secondary battery of the above-mentioned (1) publication characterized by becoming a predetermined cylinder cell specification configuration, (3) The optical-rechargeable secondary battery of the above-mentioned (1) publication with which the above-mentioned battery is characterized by being discharge voltage 0.6-1.9V, (4) the above-mentioned cylinder cell specification -- single 1 mold and C -- a mold and AA -- the optical-rechargeable secondary battery of the above-mentioned (2) publication characterized by being a mold -- (5) The optical-rechargeable secondary battery of the above-mentioned (1) publication with which the above-mentioned battery is characterized by the ability to detach and attach freely to a volume core part, (6) The optical-rechargeable secondary battery of the above-mentioned (1) publication with which the above-mentioned battery is characterized by having the configuration of predetermined cylinder cell specification, (7) the above-mentioned cylinder battery specification -- AA -- a mold and AAA -- a mold -- single -- the optical-rechargeable secondary battery of the above-mentioned (6) publication characterized by being 5 molds or a carbon button mold -- (8) The optical-rechargeable secondary battery of the above-mentioned (1) publication characterized by fixing the arcuate object to the above-mentioned stop section rotatable, (9) The optical-rechargeable secondary battery of the above-mentioned (6) publication characterized by the above-mentioned arcuate

object seeing and ****(ing) from the side-face side, (10) The optical-rechargeable secondary battery of the above-mentioned (7) publication characterized by the above-mentioned arcuate object being dismountable and being able to reverse **** from the above-mentioned side-face side, (11) The optical-rechargeable secondary battery of the above-mentioned (7) publication with which the curvature of **** from the above-mentioned side-face side of the above-mentioned arcuate object is characterized by the above-mentioned peripheral wall and the substantially same thing, (12) The curvature of **** from the above-mentioned side-face side of the above-mentioned arcuate object is substantially [as the above-mentioned peripheral wall] the same. The optical-rechargeable secondary battery of the above-mentioned (7) publication characterized by settling the above-mentioned arcuate object in the outermost periphery curved surface of the above-mentioned peripheral wall, (13) The optical-rechargeable secondary battery of the above-mentioned (7) publication characterized by settling the above-mentioned arcuate object in the outermost periphery curved surface of the above-mentioned peripheral wall, and stopping the above-mentioned rotation, (14) The optical-rechargeable secondary battery of the above-mentioned (1) publication whose means for fixing is the hook with a sucker, adhesives, a pin, or a binder, (15) Optical-rechargeable secondary battery of the above-mentioned (1) publication which is the field where other members faced the room space of a glass window, a field facing the open air of a glass window, or the wall surface of a building (16) The above (1) It is related with the electrical machinery and apparatus using an optical-rechargeable secondary battery given in either of - (15).

[0008]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail, referring to a drawing. Below, suppose that the optical-rechargeable secondary battery 1 as shown in drawing 1 and drawing 2 is explained as an optical-rechargeable secondary battery which applied this invention.

[0009] The optical-rechargeable secondary battery 1 concerning this invention is wound around cylinder-like the volume core part 2 and this volume core part 2, and where it has the photo-electric-conversion sheet 3 which has the flexibility arranged free [enlargement] and the battery 4 formed in the interior of the volume core part 2, and the control circuit section 5, it presents the shape of a whole cylindrical shape. Moreover, the photo-electric-conversion sheet 3 is made to receive light in the condition of having rolled the photo-electric-conversion sheet 3 and having extended from the core part 2, and an optical-rechargeable secondary battery 1 charges a battery 4, as shown in drawing 3 .

[0010] The volume core part 2 is formed in the shape of a cylindrical shape with resin ingredients, such as polystyrene system resin represented by for example, ABS (acrylonitrile-styrene butadiene rubber) resin, SAN (styrene-acrylonitrile) resin, AAS (acrylonitrile-acrylate-styrene) resin, etc. As for the volume core part 2, being formed for a long time slightly is more desirable than the width of face around which the photo-electric-conversion sheet 3 is wound so that the photo-electric-conversion sheet 3 can be continued and rolled round to full. Moreover, the upper flange 6 and the lower flange 7 are formed in the both ends at the volume core part 2, respectively. In addition, the optoelectric transducer is usually supported on the photo-electric-conversion sheet.

[0011] The upper flange 6 and the lower flange 7 are formed in approximate circle form plate-like with the same ingredient as the volume core part 2, and are being fixed to the both ends of the volume core part 2 by fixed means, such as adhesives, respectively. In addition, the upper flange 6 and the lower flange 7 may be formed in the volume core part 2 and one. As for the path of an upper flange 6 and a lower flange 7, it is desirable to be formed so that it may become the path of the photo-electric-conversion sheet 3 in the condition of having been wound around the volume core part 2, identically, or a little large. Thereby, while an upper flange 6 and a lower flange 7 can protect the side edge section of the photo-electric-conversion sheet 3, they can serve as a guide at the time of rolling the extended photo-electric-conversion sheet 3, and rolling round to a core part 2, can roll the photo-electric-conversion sheet 3, without carrying out a location gap, and can be made to wind it around a core part 2.

[0012] As for the volume core part 2, an upper flange 6, and a lower flange 7, it is desirable to be formed with the ingredient which has electric insulation, such as for example, denaturation polyphenylene ether (denaturation PPE), a polyether ether ketone (PEEK), polyphenylene sulfide (PPS), a polyether ape phon (PES), and polyester. Electric insulation can prevent that it is as that these each part short-circuits electrically by contacting the terminal of the battery holder of an electrical machinery and apparatus etc. **** [, and]. [that internal wiring etc. short-circuits through these each part] Moreover, it is desirable to use the ingredient excellent in the heat insulation property, and resin, such as polyester system resin, polyethylene system resin, polystyrene system resin, and polyurethane system resin, is mentioned as such an ingredient. Adiathermic can prevent breakage by the temperature of the battery 4 contained inside rising, when exposed to the elevated temperature of being left in the dashboard of an automobile. Since it is the same, as for these each part, it is desirable to be colored the color which can absorb neither light nor heat easily like white. The positive-electrode terminal 8 and the negative-electrode terminal 9 which are formed, for example with dielectric ingredients, such as resin, such as metallic oxides, such as glass, a quartz, a ceramic, magnesium oxide, and an

aluminum oxide, and polytetrafluoroethylene, respectively are prepared in the upper flange 6 and the lower flange 7. The positive-electrode terminal 8 and the negative-electrode terminal 9 are electrically connected with the predetermined terminal of the control circuit section 5 by the connection means which is not illustrated, respectively.
[0013] Furthermore, as shown in drawing 1 and drawing 2 , the optical-rechargeable secondary battery 1 concerning this invention is equipped with the peripheral wall 51 which presents the shape of an upper flange 6 and a lower flange 7, and a cylindrical shape of approximately the same diameter, and is constituted. Slot 6a to which the side edge section of a peripheral wall 51 fits into an upper flange 6 and a lower flange 7 free [rotation], respectively as shown in drawing 5 And slot 7a It is prepared. Therefore, a peripheral wall 51 is rolled and is rotated free to a core part 2, an upper flange 6, and a lower flange 7. Moreover, slit 51a which has sufficient width of face and thickness to pull out the photo-electric-conversion sheet 3 in a peripheral wall 51 as shown in drawing 6 It is punched. Slit 51a By having the peripheral wall 51 which it has free [rotation], the drawer of the photo-electric-conversion sheet 3 and rolling up become easy. Moreover, when contained by the electrical machinery and apparatus by having a peripheral wall 51, it has not been said that the photo-electric-conversion sheet 3 will wind and get loose. Furthermore, a peripheral wall 51 can protect the photo-electric-conversion sheet 3 from damage by dust, an impact, etc. of external environment, and heating of the battery 4 by direct rays etc. can be prevented. In order to improve the heating prevention effectiveness of a battery 4 further, as for a peripheral wall 51, it is desirable to be colored the color which can absorb neither light nor heat easily like white.
[0014] Furthermore, as an optical-rechargeable secondary battery 1 is shown in drawing 6 , it is stop section 3a to the outermost periphery of the photo-electric-conversion sheet 3. It is formed. This stop section 3a When the photo-electric-conversion sheet 3 winds and it is wound around a core part 2, it is slit 51a. It is desirable to have sufficient thickness to join. Stop section 3a While having the function in which the photo-electric-conversion sheet 3 prevents being completely involved in the interior of a peripheral wall 51, it has the function as a handle at the time of pulling out the photo-electric-conversion sheet 3.
[0015] In this invention, stop section 3a is improved and optical charge is made easy. That is, as shown in drawing 9 , it is fixable to fixed part 3c so that arcuate object 3b may become rotatable and dismountable at stop section 3a. When arcuate object 3b is seen from a side-face side, it has the configuration of radii and has curvature equivalent to a peripheral wall 51. You can make it buried in slot 51b dug in the peripheral wall 51 practical. Slot 51b may be formed in bilateral symmetry. That is, the configuration of the radii which have reverse curvature can be given by giving the spreading elasticity to arcuate object 3b, removing from fixed part 3c, and substituting by reversal, in view of a side-face side. When contained by slot 51b, fitting can be carried out to fitting section 51c formed in the peripheral wall 51, and it can be made to fix to it, although contained by another slot 51b to which arcuate object 3b is located in the opposite side with this substitution.
[0016] As shown in drawing 10 thru/or 11, by constructing in a fastener 15, arcuate object 3b of this invention can open a photo-electric-conversion sheet up and down in outside or an outer wall among the glass windows which daylight tends to take, and can perform optical charge easily. Furthermore, by substitution of arcuate object 3b, when placing outside among glass windows, the photo-electric-conversion sheet 3 can be stuck more on glass, and it can turn in the direction of outdoor daylight. Furthermore, it can be made hard to be able to stick the photo-electric-conversion sheet 3 with glass etc., to be able to turn in the direction of outdoor daylight with the configuration of the arc shape of arcuate object 3b, and to change the sense of the photo-electric-conversion sheet 3 by disturbance, such as a wind. Moreover, to the good base material of the smoothness of a glass window etc., although a fastener 15 has a desirable sucker etc., the fastener fixed to specification can also be used for it. Making a fastener fixing by adhesives, a pin, etc. in this case, the hook with commercial adhesives, etc. can be used.
[0017] In case a battery 4 is charged, as it is shown in drawing 2 , it is stop section 3a. By pulling out, the photo-electric-conversion sheet 3 winds and it is pulled out from a core part 2. Moreover, by rolling a peripheral wall 51 and making it rotate to a core part 2, an optical-rechargeable secondary battery 1 can roll the photo-electric-conversion sheet 3, and can roll it round to a core part 2. The photo-electric-conversion sheet 3 is constituted by the sheet-like substrate 10 which has flexibility and was formed in the shape of an abbreviation rectangle sheet, and two or more optoelectric transducers 11 arranged on this sheet-like substrate 10 as shown in drawing 3 and drawing 4 . The sheet-like substrate 10 is formed with the ingredient which has the insulation of for example, denaturation polyphenylene ether (denaturation PPE), a polyether ether ketone (PEEK), polyphenylene sulfide (PPS), a polyether ape phon (PES), polyester, etc., and it is formed in the shape of a sheet so that it may have flexibility. The 1st electrode layer 12, the photo-electric-conversion layer 13, and the 2nd electrode layer 14 carry out the laminating of each optoelectric transducer 11 to the shape of a thin film one by one, respectively, and it comes to form it on the sheet-like substrate 10. the various PVD with which each class which constitutes an optoelectric transducer 11 is represented by a spatter and vacuum deposition or a plasma-CVD method, and MOCVD -- it is formed in the shape of a thin film on the sheet-like

substrate 10 by the various CVD methods represented by law. An optoelectric transducer 11 has sufficient flexibility like the sheet top substrate 10 by forming each class in the shape of a thin film.
[0018] Furthermore, the photo-electric-conversion sheet 3 can have the macromolecule laminating sheet which has flexibility. This macromolecule laminating sheet is a wrap thing about the light sensing portion top of an optoelectric transducer, and this part has light transmission nature at least. As for this macromolecule laminating sheet, it is desirable to cover the whole surface of a photo-electric-conversion sheet, and it is still more desirable to form so that it may ****** from the edge of a photo-electric-conversion sheet and the edge of a photo-electric-conversion sheet may be protected. Moreover, although it is desirable to prepare in the light-receiving side side of a photo-electric-conversion sheet as for a macromolecule laminating sheet, it is preparing in the background of the light-receiving side of a photo-electric-conversion sheet still more preferably. This repeats and extends the optoelectric transducer which has flexibility, and when using light-receiving area, enlarging it, the damage or degradation of an optoelectric transducer by crookedness of the repeat of an optoelectric transducer can be reduced. Furthermore, to sliding of the repeat of the front face accompanying the enlargement of the repeat of an optoelectric transducer, damage or degradation of an optoelectric transducer can be prevented and the decline in the generating efficiency as the whole component, as a result charge performance degradation can be prevented. Moreover, although plastic deformation (the so-called core set is attached) of the photo-electric-conversion sheet will be carried out and effective light-receiving of an optoelectric transducer will be barred when an optoelectric transducer is in a winding condition at a long period of time, plastic deformation can be reduced by existence of a macromolecule laminating sheet, and effective light-receiving can be obtained. When using a macromolecule laminating sheet for the front flesh side of a photo-electric-conversion sheet as mentioned above, it can also constitute from a sheet material of table back identitas, and can also constitute from a sheet material of a different kind suitably. As the quality of the material, it is desirable for a wrap thing to be the ingredient of light transmission nature about the light sensing portion top of an optoelectric transducer at least. Moreover, it is desirable to have the abrasion resistance to friction and the weatherability to light. As such an ingredient, the polymer of a halogenation olefin, especially a fluorination olefin or the copolymer of this and an olefin is illustrated, for example. Furthermore, a glue line can be prepared in order to make a photo-electric-conversion sheet fix these sheets. Ethylene and the copolymer of vinyl acetate are illustrated as an ingredient of this glue line.
[0019] In the photo-electric-conversion sheet 3, each optoelectric transducer 11 of each other is electrically connected to the serial, and positive-electrode terminal 12a and negative-electrode terminal 14a are formed in the electrode layer of the optoelectric transducer 11 located in the both ends of the direction of a short hand, respectively. Positive-electrode terminal 12a and negative-electrode terminal 14a are electrically connected with the predetermined terminal of the control circuit section 5, respectively. Moreover, the optoelectric transducer 11 is considered as the configuration to which incidence of the light, such as sunlight, is carried out from principal plane 11a of the side which attends the opposite side, i.e., the method of outside, in the sheet-like substrate 10. The 1st electrode layer 12 and the 2nd electrode layer 14 are formed with dielectric ingredients, such as resin, such as metallic oxides, such as a ceramic, magnesium oxide, and an aluminum oxide, and polytetrafluoroethylene, and have achieved the function as an electrode of a pair to the photo-electric-conversion layer 13.
[0020] The photo-electric-conversion layer 13 is a-Si. pin It has the noncrystal semiconductor thin film represented by junction structure, and is formed, and by carrying out incidence of the light, such as sunlight, it considers as the configuration which electromotive force produces, and is formed with the film configuration which has the so-called photo-electric-conversion effectiveness. Furthermore, the photo-electric-conversion layer 13 may be pn junction structure formed by p mold organic semiconductors, such as perylene, and n mold organic semiconductors, such as a copper phthalocyanine. In addition, the photo-electric-conversion layer 13 is not limited to the diaphragm structure mentioned above, and should just be formed with the film configuration which has sufficient flexibility and has the photo-electric-conversion effectiveness. in addition, the 1st electrode layer 12 -- for example, Ag, aluminum, Cr, nickel, and Cu etc. -- it is desirable to be formed with a metallic material, and to be formed so that the reflection factor to the light which makes the photo-electric-conversion layer 13 receive light may become high. The light which penetrated the photo-electric-conversion layer 13 can be reflected by this, incidence can be again carried out to the photo-electric-conversion layer 13, and the photoelectric conversion efficiency of the photo-electric-conversion layer 13 can be raised. Moreover, as for the 2nd electrode layer 14, it is desirable to be formed as the so-called transparent electrode formed with the ingredient which uses the metallic oxide of SnO2 or In2O3 grade as a principal component. The light which makes the photo-electric-conversion layer 13 receive light can be penetrated efficiently by this, and the photoelectric conversion efficiency of the photo-electric-conversion layer 13 can be raised.
[0021] In addition, in drawing 3 and drawing 4 , the example by which the 1st electrode layer 12 of the specific optoelectric transducer 11 and the 2nd electrode layer 14 were used as the 2nd electrode layer 12 of this optoelectric transducer 11 and adjoining another optoelectric transducer 11 and the 1st electrode layer 14, respectively, and two or

more optoelectric transducers 11 were considered as the configuration which shares each electrode layer is shown. Thereby, in the photo-electric-conversion sheet 3, optoelectric-transducer 11 adjoining comrades are considered as the configuration by which series connection was carried out electrically. In this case, the light reflex layer (not shown) which formed with the ingredient which uses the metallic oxide of SnO2 or In2O3 grade as a principal component, for example as the 1st electrode layer 12 and the 2nd electrode layer 14 were mentioned above, and was formed with the metallic material etc. between the 1st electrode layer 12 and the sheet-like substrate 10 may be had and formed. Thereby, each optoelectric transducer 11 can raise photoelectric conversion efficiency by the light reflex layer while being able to receive sufficient quantity of light through the 2nd electrode layer 14. moreover -- in this case -- each [optoelectric-transducer 11] -- the die length of that longitudinal direction, and abbreviation -- as compared with the case where the electrode of equivalent die length will connect by the line, for example, each [optoelectric-transducer 11] are connected by lead wire etc. at a point, a possibility that poor connection, such as an open circuit, may arise can be reduced.

[0022] Moreover, in the photo-electric-conversion sheet 3, each optoelectric transducer 11 is arranged in parallel to the longitudinal direction. That is, the electrode layer of the pair of each optoelectric transducer 11 is arranged so that it may become the longitudinal direction of the photo-electric-conversion sheet 3 in parallel. Thereby, in order to charge a battery, when an optical-rechargeable secondary battery extends the photo-electric-conversion sheet 3, even if it is the case where light is not fully irradiated by a part of this optoelectric transducer, it can prevent decline in the generating efficiency of the whole photo-electric-conversion sheet. Furthermore, the photo-electric-conversion sheet 3 is wound to the volume core part 2, and is arranged free [enlargement], the 1 side which becomes a most-inner-circumference side rolls it, and connection immobilization is carried out at the core part 2. Positive-electrode terminal 12a mentioned above in the 1 side by the side of this most inner circumference And negative-electrode terminal 14a It is prepared.

[0023] As drawing 7 and drawing 8 show, the edge of the optoelectric-transducer section 11 of the photo-electric-conversion sheet 3 is slit 51a of a peripheral wall 51 in an enlargement condition. So that it can fully exist outside It does not have the optoelectric-transducer section 11 from the 1 side which becomes the volume core part 2 the most-inner-circumference side of the above-mentioned photo-electric-conversion sheet 3 by which connection immobilization is carried out to the edge by the side of the inner circumference of the optoelectric-transducer section 11 of the photo-electric-conversion sheet 3, but is positive-electrode terminal 12a. Negative-electrode terminal 14a The sheet section 31 which it has is made to intervene. Electric shielding of the light of the above-mentioned peripheral wall 51 of the optoelectric-transducer section 11 which pulls out in charge actuation and is depended insufficiently by this can be prevented. Furthermore, the optoelectric-transducer section 11 can be moved to a periphery side with more low curvature from inner circumference with high curvature, and fatigue degradation by crookedness of the optoelectric-transducer section 11 can be fallen. Moreover, compared with what has an optoelectric transducer, the sheet section 31 which does not have an optoelectric transducer can have high flexibility, and it can improve the endurance of connection immobilization in the volume core part 2 of the photo-electric-conversion sheet 3. In this case, although the sheet section 31 which does not have an optoelectric transducer can also be made to form by the photo-electric-conversion sheet 3 and one, it can connect and form the sheet of the same or another material if needed. Moreover, the photo-electric-conversion sheet 3 is in the condition wound to the volume core part 2, and it can be arranged so that the light-receiving side may serve as the inside. Thereby, the photo-electric-conversion sheet 3 can wind, in case it is wound around a core part 2 and discharge use is carried out, the light-receiving side of the photo-electric-conversion sheet 3 cannot be exposed to the method of outside, and an optical-rechargeable secondary battery 1 can prevent carrying out that a light-receiving side gets damaged etc., and damaging. It can arrange so that the light-receiving side may be carried out outside when few [of concern of the above-mentioned breakage], and it may wind so that in [although it is arranged so that a photo-electric-conversion sheet may **** the light-receiving side inside and it may wind and may be wound around a core part 2 it may not be limited to such a configuration, and] the gestalt of this operation, and it may be wound around a core part 2.

[0024] The battery 4 is contained by the building envelope of the volume core part 2, and is a rechargeable battery in which charge and discharge are possible. A nickel-hydrogen rechargeable battery, a nickel-cadmium rechargeable battery, a nickel-zinc rechargeable battery, a zinc-silver-oxide rechargeable battery, an iron-nickel rechargeable battery, etc. are specifically raised, and, as for a battery 4, it is especially desirable that it is a nickel-hydrogen rechargeable battery. Thereby, heavy metal, such as lead or cadmium, is not used for it, but a battery 4 becomes the thing excellent in environmental compatibility while it can raise the energy density per volume. the specification dry cell by which a battery 4 has a predetermined cell specification configuration -- you may be -- concrete -- IEC JIS etc. -- the defined so-called AA -- R6 mold cell called a mold and AAA -- R03 mold cell called a mold, R1 mold cell called single 5 molds or R44 mold cell called a carbon button mold, R1220 mold cell, etc. may be used. Thereby, development and a manufacturing cost can be held down in an optical-rechargeable secondary battery 1. However, when it sees from a

viewpoint of accumulation-of-electricity capacity, it is desirable to enclose battery structures, such as the direct electrolytic solution, with the building envelope of the volume core part 2, without using a specification battery. A battery structure can be enclosed even with the space equivalent to the sheathing section of a specification battery by this, and the accumulation-of-electricity capacity of a battery 4 can be increased.

[0025] Moreover, a battery 4 may be constituted so that it can detach and attach freely to the volume core part 2. You may constitute so that closing motion of a part of lower flange 7 may be enabled, it may wind from this closing motion section and it may specifically insert [battery / 4] to a core part 2. Or closing motion of a part of volume core part 2 exposed to the method of outside, for example where the photo-electric-conversion sheet 3 is extended may be enabled, and you may constitute so that it may wind from this closing motion section and a battery 4 may be detached and attached to a core part 2. Even when a battery 4 repeats charge and discharge and a life is exhausted in an optical-rechargeable secondary battery 1 by this, only this battery 4 can be exchanged. Therefore, it becomes unnecessary for an optical-rechargeable secondary battery 1 to discard other each part which has a long life compared with a battery 4 with the battery 4 by which the life was exhausted, and it will become desirable from a viewpoint of effective use of a resource. Moreover, thereby, an optical-rechargeable secondary battery 1 can be used as a battery charger for charging a battery 4. That is, with an optical-rechargeable secondary battery 1, a battery 4 can be charged, the battery 4 which charge completed can be picked out from an optical-rechargeable secondary battery 1, and this battery 4 can also be used as a power source of electronic equipment. Furthermore, it is good also as attachment and detachment being free to the volume core part 2 while a specification battery is used for a battery 4, as mentioned above. By this, in case a battery 4 is exchanged, this exchange can be performed simple and easily. Moreover, also in this case, as mentioned above, an optical-rechargeable secondary battery 1 may be used as a battery charger for charging a battery 4. Thereby, attachment and detachment of the battery 4 which has a specification battery configuration are enabled from an optical-rechargeable secondary battery 1, and it becomes easy [using the usual specification cell to the electrical machinery and apparatus used as a power source]. Moreover, as for a battery 4, it is desirable for the discharge voltage to be about abbreviation 0.6-1.9V. Thereby, an optical-rechargeable secondary battery 1 can prevent breakage of the device by that it cannot be made to operate without fulfilling the operating voltage of these electrical machinery and apparatus, or exceeding an allowable voltage, when used to the electrical machinery and apparatus which uses the usual telescopic specification cell as a power source.

[0026] The control circuit section 5 is rolled as shown in drawing 1 , and it is arranged in the building envelope of a core part 2. The control circuit section 5 is suitably equipped with a ********** function from the rectification function of the photo-electric-conversion sheet 3 and a battery 4, the overcharge prevention function of the battery 4 by the photo-electric-conversion sheet 3, the overdischarge prevention function of a battery 4, etc. Although the electric circuit which used diode, an operational amplifier, etc. can constitute the control circuit section 5, since a rectifier circuit, a overcharge prevention circuit, and an overdischarge prevention circuit which are usually used in the electrical and electric equipment and/, or the electronic field can constitute, specifically, it omits the detailed explanation about the circuitry. Moreover, the control circuit section 5 is equipped with at least four terminals, and positive-electrode terminal 12a of the photo-electric-conversion sheet 3 and negative-electrode terminal 14a, and the positive-electrode terminal and negative-electrode terminal of a battery 4 are electrically connected to these terminals, respectively. And the control circuit section 5 functions as the ability of charge by the photo-electric-conversion sheet 3 of a battery 4, and discharge from a battery 4 to be performed efficiently.

[0027] An optical-rechargeable secondary battery 1 is in the condition which was constituted as explained above, rolled the photo-electric-conversion sheet 3, and was wound around the core part 2, and as shown in drawing 2 , it presents the shape of a whole cylindrical shape. In this condition, an optical-rechargeable secondary battery 1 becomes easy [detaching, attaching and using to these electrical machinery and apparatus as a power source of an electrical machinery and apparatus]. Moreover, an optical-rechargeable secondary battery 1 is in the condition which rolled the photo-electric-conversion sheet 3 and was wound around the core part 2, and it is desirable that it can be determined that the dimension of each part etc. has a predetermined telescopic cell specification configuration. an optical-rechargeable secondary battery 1 -- concrete -- for example, IEC JIS etc. -- R20 mold cell called single 1 defined so-called mold and C -- R14 mold cell called a mold or AA -- you may be R6 mold cell called a mold. Thereby, an optical-rechargeable secondary battery 1 can make it easy to use to the electrical machinery and apparatus designed so that the usual telescopic specification cell might be contained and used. Therefore, in this case, an optical-rechargeable secondary battery 1 can change and store the light energy of sunlight in electrical energy, and can use it as the power source of the electrical machinery and apparatus which uses a telescopic specification cell which is usually used. Moreover, as shown in drawing 3 , an optical-rechargeable secondary battery 1 is in the condition which rolled the photo-electric-conversion sheet 3 and was extended from the core part 2, and charges a battery 4. Since an optical-rechargeable secondary battery 1 can turn all to the light-receiving area of the photo-electric-conversion sheet 3 at the

direction of radiation of light at this time, the generation-of-electrical-energy force of this photo-electric-conversion sheet 3 can be raised. Therefore, an optical-rechargeable secondary battery 1 can shorten the charging time at the time of charging a battery 4 practically enough. In addition, the optical-rechargeable secondary battery concerning this invention is not limited to the configuration, the number, the stowed position, etc. of a battery 4. Two or more batteries 4 may be formed in the interior of an optical-rechargeable secondary battery 1, and support immobilization may be carried out so that a location gap may not be carried out with elastic bodies, such as a coil spring and a flat spring. Moreover, as mentioned above, the optical-rechargeable secondary battery concerning this invention is not limited to the configuration by which the 1 side which becomes the most-inner-circumference side of the photo-electric-conversion sheet 3 wound, and connection immobilization was carried out to the core part 2, and is good also as attachment and detachment being free to an optical-rechargeable secondary battery 1 in the photo-electric-conversion sheet 3. Thereby, an optical-rechargeable secondary battery 1 can exchange and use this for the normal photo-electric-conversion sheet 3, when physical or electric breakage arises on the photo-electric-conversion sheet 3. Namely, the optical-rechargeable secondary battery concerning this invention should just be the configuration that the photo-electric-conversion sheet 3 is electrically connected with a battery 4 at the time of charge at least.

[0028] The optical-rechargeable secondary battery concerning this invention can be used as a power source of the electrical machinery and apparatus usually used. The optical-rechargeable secondary battery concerning this invention is especially used suitable for a cellular phone, a portable music playback machine, etc. from the ability for it to be convenient to carry and use easily.

[0029]

[Effect of the Invention] By giving the means which is fixable to other members to the stop section of the drawer edge of an optoelectric transducer, the optical-rechargeable secondary battery concerning this invention is fixing an optoelectric transducer in the specific direction, and enables stable charge. Moreover, prevention, the decline in the generating efficiency as the whole component, as a result charge performance degradation can be prevented for the damage or degradation of an optoelectric transducer by the external force accompanying drawer receipt. An earth resource is effectively utilizable, while it becomes practical with the optical-rechargeable secondary battery concerning this invention to use light energies, such as sunlight, as a power source of an electrical machinery and apparatus and being able to prevent the environmental pollution by generating of harmful excretions.

[Translation done.]